

ON THE FISH FAUNA OF KEOLADEO NATIONAL PARK, BHARATPUR (RAJASTHAN)¹

C. R. AJITH KUMAR AND V. S. VIJAYAN²

(With a text-figure)

INTRODUCTION

One of the major attractions of Keoladeo National Park, a world heritage site, is its rookeries and heronries huddled on babul trees (*Acacia nilotica*) in the semi-aquatic areas of the Park. Although the importance of fish to these colonies of fish eating birds was emphasized by Salim Ali (1953) about three decades ago, no concerted effort has been made hitherto to study the fish fauna of the Park in detail. Saxena (1975), Datta and Majumdar (1970), and Mahajan (1980) have reported the faunal elements but their study was seasonal and hence incomplete.

The present report covers a survey of the fish fauna of Keoladeo National Park, conducted between 1982 and 1985 as part of a long-term ecological study of the Keoladeo National Park by the Bombay Natural History Society. Altogether 40 species have been recorded. Some species recorded by earlier workers were not seen during the present study while some new species have been added both to the fish fauna of Keoladeo National Park and to that of Rajasthan. All the species recorded so far by various workers have been included in the checklist.

KEOLADEO NATIONAL PARK

Keoladeo National Park (27° 7.6' to 27° 12.2' N and 77° 29.5' to 77° 33.9'E) is a tiny wet-

land surrounded by villages, about 3 km. from Bharatpur town. It is halfway (180 km.) between Jaipur and Delhi and is about 58 km. south of Agra.

The Park is 28.5 sq. km., out of which the aquatic area is only 8.5 sq. km. The entire aquatic area is divided into various compartments by means of bunds, and the water level in each compartment is regulated through sluice gates. The maximum water depth is up to two metres. During summer the Park dries up, leaving only a few isolated pools (for more details, see Salim Ali & Vijayan 1983).

Water temperature varied from 12° to 32°C during the study period, the maximum being in May and the minimum in January. Annual rainfall during 1982 to 1985 was 27 to 52 cm., received mainly during July to August.

The aquatic vegetation of the area consists mainly of: (1) Submerged vegetation, namely *Hydrilla verticellata*, *Ceratophyllum* sp., *Najas minor*; (2) Floating vegetation, namely *Nymphaea nouchali*, *N. stellata*, *Nymphoides cristatum*, *N. indicum*, *Ipomoea aquatica*, *Azolla bipinnata*, *Lemna paucicostata*, *Wolffia arrhiza*, and (3) Emergent vegetation, such as *Paspalum distichum*, *Elaeocharis plantaginea*, *Sporobolus helvolus* and *Cyperus alopecuroides*.

Water source to the Park.

A consideration of the water source to the Park, its geographic position, and the age old management practice will give an insight into the fish fauna of the Park.

¹ Accepted February 1987.

² Ecological Research Centre, Keoladeo Ghana National Park, Bharatpur 321 001, Rajasthan.

The Park is situated at the confluence of two non-perennial rivers—Gambir and Banganga; the former originates from the Karoli hills of Sawai Madhopur, flows about 280 km. before reaching Bharatpur and passes through Bharatpur to join Yamuna on the east. River Banganga originates near Manoharpur (near Jaipur) about 64 km. northwest of Jamwa Ramgarh, runs about 241 km. before terminating at Mekpur head, 18 km. short of Bharatpur (Fig. 1).

Water from Gambir and Banganga is drawn through Pichuna canal and Uchain canal respectively and empties into a temporary reservoir, Ajanbund, situated approximately 500 metres south of the Park. From here the water is let into the Park through Ghana canal. Enormous number of fish fry also enter the Park through these waters. Thus the aquatic ecosystem of the Park is an open system, having connections with the aforesaid two rivers which finally join the perennial Yamuna. The fish fauna of the Park also represents, partially at least, the fauna of all these waters. Even though the rivers are non-perennial, permanent large water bodies such as Jamwa Ramgarh Tal, Bund Baretta, Jagur Tal and Kalako Bund are connected to either Banganga or Gambir, forming a common water system.

Methods of collection.

The following methods were used for sampling the fish fauna:

I. *Gill nets*: Gill nets of the size 11 × 1.20 m. with mesh sizes varying from 3.5 to 6.5 cm. were used to collect fish from open water where submerged vegetation may or may not be present.

II. *Traps*: Traps of two sizes, 35 × 30 × 40 cm. and 25 × 35 × 35 cm, made of split bamboo were employed to sample fishes from areas where thick vegetation occurred.

III. *Cast net*: Was used in open water and in pools.

IV. *Fry sampling net*: The bridge over Ghana canal near 'Chital van' has five pillars. The space between the adjacent pillars was blocked with a square net made of mosquito netting to sample the fish fry entering the Park from Ajanbund. Each net was of 150 × 150 cm.

RESULT

Fish fauna of the Park

All the 50 species recorded so far are listed below, following the classification adopted by Jayaram (1981).

- I Order : CLUPEIFORMES
 Family (i): CLUPEIDAE
 Genus (1): *Gadusia* Fowler
 1. ***Gadusia chapra*** (Hamilton)

- II Order : OSTEOGLOSSIFORMES
 Family (ii): NOTOPTERIDAE
 Genus (2): *Notopterus* Lacépède
 2. ***Notopterus notopterus*** (Pallas)

- ***3. ***Notopterus chitala*** (Hamilton)

- III Order : CYPRINIFORMES
 Family (iii): CYPRINIDAE
 Genus (3): *Oxygaster* van Hasselt
 4. ***Oxygaster bacaila*** (Hamilton)

Genus (4): *Danio* Hamilton

- ****5. ***Danio*** sp.

Genus (5): *Chela* Hamilton

- ****6. ***Chela*** sp.

Genus (6): *Esomus* Swainson

7. ***Esomus danricus*** (Hamilton)

Genus (7): *Labeo* Cuvier

- **8. ***Labeo bata*** (Hamilton)

9. ***Labeo calbasu*** (Hamilton)

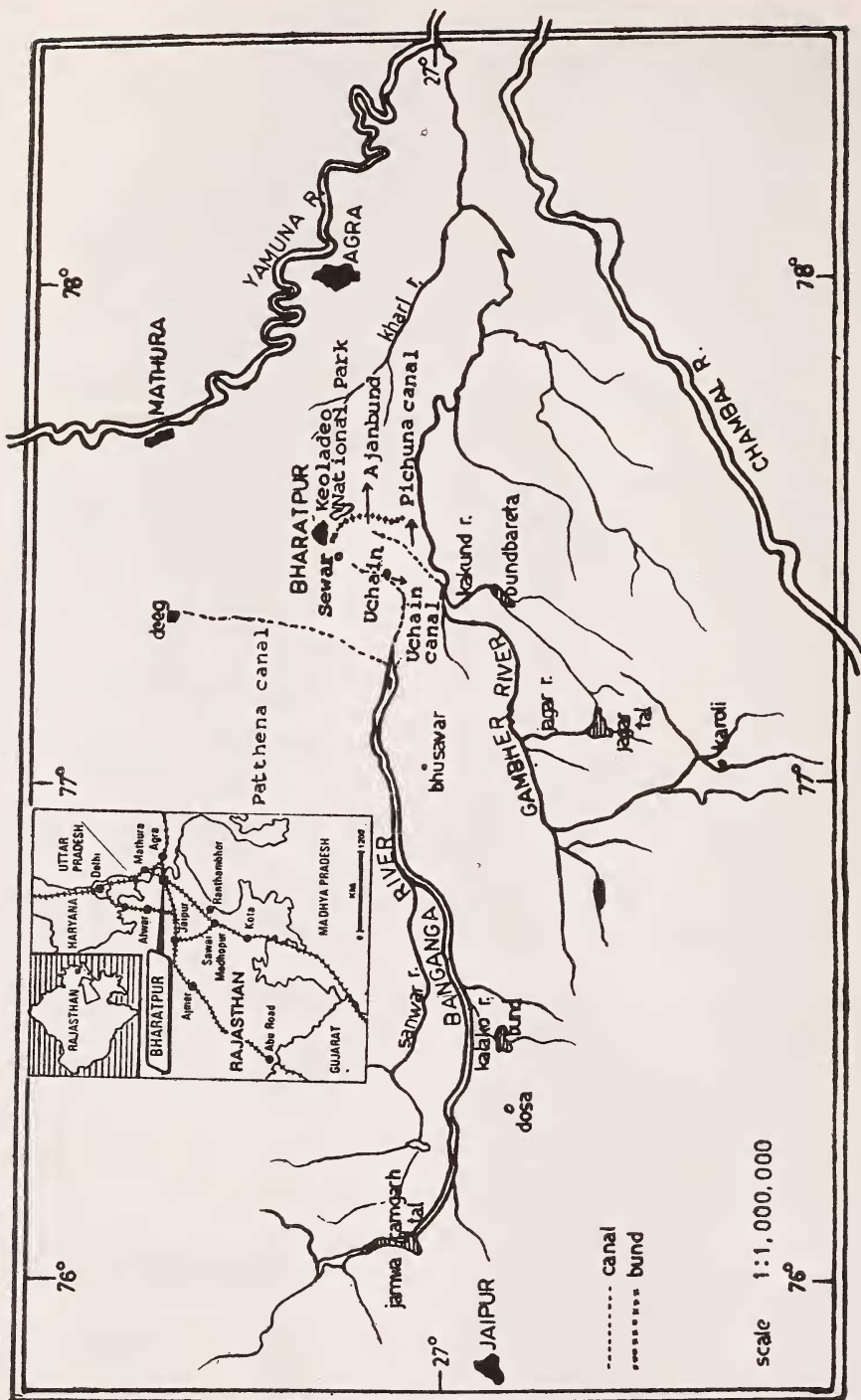


Fig. 1. Banganga and Gambher river system.

- **10. **Labeo fimbriatus** (Bloch)
 11. **Labeo gonius** (Hamilton)
 12. **Labeo rohita** (Hamilton)
- Genus (8): *Amblypharyngodon*
 Bleeker
13. **Amblypharyngodon mola** (Hamilton)
 Genus (9): *Chagunius* H. M. Smith
- *14. **Chagunius chagunio** (Hamilton)
 Genus (10): *Cirrhinas* Oken
15. **Cirrhinas mrigala** (Hamilton)
 16. **Cirrhinas reba** (Hamilton)
 Genus (11): *Catla* Valenciennes
17. **Catla catla** (Hamilton)
 Genus (12): *Puntius* Hamilton
18. **Puntius sarana** (Hamilton)
 19. **Puntius sophore** (Hamilton)
 20. **Puntius ticto** (Hamilton)
 Genus (13): *Osteobrama* Heckel
21. **Osteobrama cotio** (Hamilton)
 Genus (14): *Crossocheilus*
 van Hasselt
- ****22. **Crossocheilus latius latius** (Hamilton)
 Family (iv): COBITIDAE
 Genus (15): *Botia* Gray
- ****23. **Botia lohachata** Chaudhuri
 Genus (16): *Lepidocephalus* Bleeker
 Subgenus : *Lepidocephalichthys*
- *24. **L. (Lepidocephalichthys) guntea**
 (Hamilton)
 Genus (17): *Noemacheilus* van
 Hasselt
- *25. **Noemacheilus botia** (Hamilton)
 *26. **Noemacheilus corica** (Hamilton)
- IV Order : SILURIFORMES
 Family (v): BAGRIDAE
 Genus (18): *Mystus* Scopoli
27. **Mystus cavasius** (Hamilton)
 28. **Mystus vittatus** (Bloch)
- Genus (19): *Aorichthys* Wu
29. **Aorichthys aor**
 30. **Aorichthys seenghala**
 Family (vi): SILURIDAE
 Genus (20): *Ompok* Lacépède
- ****31. **Ompok bimaculatus** (Bloch)
 Genus (21): *Wallago* Bleeker
32. **Wallago attu** (Schneider)
 Family (vii): SCHILBEIDAE
 Genus (22): *Clupisoma* Swainson
- ****33. **Clupisoma garua** (Hamilton)
 Genus (23): *Ailia* Gray
- ****34. **Ailia coila** (Hamilton)
 Genus (24): *Pseudeutropius* Bleeker
- ****35. **Pseudeutropius atherinoides** (Bloch)?
 Genus (25): *Eutropiichthys* Bleeker
- *36. **Eutropiichthys vacha** (Hamilton)
 Family (viii): CLARIIDAE
 Genus (26): *Clarias* Scopoli
37. **Clarias batrachus** (Linnaeus)
 Family (ix): HETEROPNEUSTIDAE
 Genus (27): *Heteropneustes* Müller
38. **Heteropneustes fossilis** (Bloch)
 Family (x): SISORIDAE
 Genus (28): *Nangra* Day
- ****39. **Nangra viridescens** (Hamilton)
 V Order : ATHERINIFORMES
 Family (xi): BELONIDAE
 Genus (29): *Xenentodon* Regan
- ****40. **Xenentodon cancila** Hamilton
 VI Order : CHANNIFORMES
 Family (xii): CHANNIDAE
 Genus (30): *Channa* Scopoli
- *41. **Channa gachua** Hamilton
 42. **Channa marulius** Hamilton
 43. **Channa punctatus** (Bloch)
 44. **Channa striatus** (Bloch)
- VII Order : PERCIFORMES
 Family (xiii): CHANDIDAE
 Genus (31): *Chanda* Hamilton

- ****45. **Chanda nama** (Hamilton)
 ****46. **Chanda ranga** (Hamilton)
 Family (xiv): BELONTIDAE
 Genus (32): *Colisa* Cuvier
 ****47. **Colisa fasciata** (Schneider)
 VIII Order : MASTACEMBELIFORMES
 Family (xv): MASTACEMBELIDAE
 Genus (33): *Mastacembelus* Scopoli
 48. **Mastacembelus armatus armatus**
 (Lacépède)
 49. **Mastacembelus pancalus** (Hamilton)
 Genus (34): *Macrogathus* Lacépède
 50. **Macrogathus aculeatus** (Bloch)
 * Recorded only by Mahajan (1980).
 ** Recorded only by Saxena (1975).
 *** Recorded by both Mahajan and Saxena
 but not during the present study.
 **** Recorded only in the present study.

DISCUSSION

This study adds 13 new records to the fish fauna of Keoladeo National Park, making the total, including those recorded by earlier workers, to 50. It is also interesting to note that this tiny wetland has, altogether, added 13 species to the fish fauna of Rajasthan, increasing it to 88; the former record being 75 species (Datta and Majumdar 1970). Out of the 13 species, six, namely *Crossocheilus latius latius*, *Ailia coila*, *Nangra viridescens*, *Clupisoma garua*, *Pseudeutropius atherinoides* (?) and *Chela* sp. are recorded by us, while four, namely *Noemacheilus corica*, *Aorichthys aor*, *Eutropiichthys vacha* and *Macrogathus aculeatus* are by Mahajan (1980), two species, namely *Tor tor* and *Notopterus chitala* are by Moona (1963) and one species, *Clarias batrachus* is by Saxena (1975). None of the six species recorded by us breed inside the Park

and were collected when the water entered the Park. Three of them (*Crossocheilus latius*, *Clupisoma garua* and *Nangra viridescens*) were less frequent.

Although the fish fauna of the Park lists 50 species, the present study could record only 40. Seven species namely *Lepidocephalichthys guntea*, *Noemacheilus botia*, *N. corica*, *Aorichthys aor*, *Eutropiichthys vacha*, *Channa gachua* and *Chagunius chagunio* recorded by Mahajan (1980), two, namely *Labeo bata* and *L. fimbriatus* reported by Saxena (1975), and one species, *Notopterus chitala* recorded by both of them were not seen during the present study. As the present investigation was a continuous and intensive one for the last four years, we presume that these 10 species must have become locally extinct or were stray records. Disappearance of these species may be due to: (1) alteration or destruction of habitats in the breeding area outside the Park, (2) changes in the habitat inside the Park, (3) over-exploitation, and (4) displacement or competitive exclusion by the 'invaders'. As quantitative data on their abundance and habitat when they were present inside the Park are not available, it is not possible to attribute with certainty any of the above mentioned factors as responsible for their elimination. However, with the available information the following inference is made:

Of the 40 species recorded during the study, only six breed inside and the rest enter through the canal while the water is let in. Among the 10 locally extinct species, it is not clear how many of them were breeding inside. It is likely, two of them, *Channa gachua* and *Notopterus chitala* might have been breeding inside as their congeners *Channa punctatus*, *C. striatus*, *C. marulius* and *Notopterus notopterus* are the major breeding species of the Park. As coexistence of congeneric sympatric species is often due to different ecological require-

ments (Cody 1974, Pontin 1982), a minor alteration of the habitat might affect the chances of their survival. Pertinent at this point is the uncontrolled growth of *Paspalum distichum*, a perennial, amphibious grass, and the subsequent changes in the aquatic system owing to the prevention of buffalo grazing since 1982. Habitat stress leads to competition especially in the congeneric sympatric species which may ultimately exclude the weaker ones (Stephens 1970, Zaret 1971). This may be true for two out of the ten locally extinct species which have their congeners in the Park. Except *Channa gachua*, *Chagunius chagunio*, *Lepidocephalichthys guntea*, *Noemacheilus botia* and *N. corica* all the other species which were not seen now are economically important. Hence over-exploitation might also have played a major role. Tor mahseer, *Tor tor*, one of the important sport fishes reported by Moona (1963)

in Ajanbund, was not seen during the present study and it is noticed that there has been a drastic decline in their number in the rivers of North India (Kulkarni 1980, Jhingran 1982)

The local extinction may be the result of all the factors mentioned above, operating together or individually. Our ongoing study on the ecology of major species in the Park may throw more light into this.

ACKNOWLEDGEMENTS

We gratefully acknowledge the help rendered by Mr. T. K. Sen, Officer-in-charge, Freshwater Fish Section, Zoological Survey of India for confirmation of identification of the species. We also thank Dr. C. V. Kulkarni for critically going through the manuscript and also Mr. J. C. Daniel, Curator, Bombay Natural History Society for the constant encouragement.

REFERENCES

- ALI, SALIM (1953): The Keoladeo Ghana of Bharatpur (Rajasthan). *J. Bombay nat. Hist. Soc.* 51 (3): 531-536.
- ALI SALIM & VIJAYAN, V. S. (1983): Hydrobiology (Ecological) Research at Keoladeo National Park, Bharatpur. First Interim Report, Bombay Natural History Society.
- CODY, M. (1974): Competition and the structure of bird communities. Princeton, New Jersey. 318 pp.
- DATTA, A. K. & MAJUMDAR, N. (1970): Fauna of Rajasthan, India. Part 7, Fishes. *Rec. Zool. Surv. India.* 62: 63-100.
- JAYARAM, K. C. (1981): The Freshwater fishes of India, Pakistan, Bangladesh, Burma and Sri Lanka. Zoological Survey of India, Calcutta. 475 pp.
- JHINGRAN, (1982): Fish and fisheries of India. Hindustan Publishing Corporation, Delhi. pp. 666.
- KULKARNI, C. V. (1980): Eggs and early development of Tor mahseer Fish. *J. Bombay nat. Hist. Soc.* 77(1): 70-75.
- MAHAJAN, C. L. (1980): Effect of human activities on the structure and functioning of freshwater ecosystems of Ghana Bird Sanctuary, Bharatpur. Rajasthan. A Preliminary Report in the Man and Biosphere Project. Dept. of Science and Technology, Govt. of India, 1976-1979.
- MATHUR, B. B. L. (1952): Notes on Fishes from Rajasthan, India. *Rec. Ind. Mus. Delhi.* 50(1): 105-110.
- MOONA, J. C. (1963): Notes on fishes from Bharatpur District, Rajasthan. *Rec. Ind. Mus. Delhi.* 58(2): 59-66.
- PONTIN, A. J. (1982): Competition and coexistence of species. Pitman Advanced Publishing Programme, London. 102 pp.
- SAXENA, V. S. (1975): A study of flora and fauna of Bharatpur Bird Sanctuary. Dept. of Tourism, Rajasthan.
- STEPHENS, JOHN S. JR. (1970): The comparative ecology of three sympatric species of Californian blennids. *Ecol. Monogr.* 40(2): 213-233.
- ZARET, THOMAS M. (1971): Competition in tropical stream fishes. Support for the competition exclusion principle. *Ecol.* 52(2): 336-342.